

A NEW SPECIES OF THE BITING MIDGE GENUS *DASYHELEA* KIEFFER
(DIPTERA: CERATOPOGONIDAE) FROM THE BAHAMAS

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Abstract.—*Dasyhelea morrisoni* Grogan and Wieners, new species, is described and illustrated from small islets near Staniel Cay, Exuma Cays, Bahamas, and compared with other similar congeners. This small, new species is most closely related to the Nearctic species, *D. brevicornis* Waugh and Wirth and together they form the *Dasyhelea brevicornis* group (**new species group**).

Key Words: Diptera, Ceratopogonidae, *Dasyhelea*, biting midges, new species, Bahamas

The biting midges of the genus *Dasyhelea* Kieffer are typically small to very small flies that inhabit a wide variety of wet habitats worldwide except for the Antarctic region. Ten extinct species and nearly 470 extant species have been described (Borkent and Wirth 1997), but, undoubtedly, many more species still await discovery. Despite their common name, females of all species of *Dasyhelea* have reduced, vestigial, malelike mandibles without teeth and do not take blood meals, but, like their male counterparts, they obtain sugar and water from nectar of flowers (Downes 1969). The larvae are aquatic and inhabit a variety of freshwater ecosystems where they usually graze on algae and morphologically resemble the larvae of many species of Chironomidae.

Through the kindness of Lloyd Morrison (the Center for Medical, Agricultural, and Veterinary Entomology, USDA-ARS, Gainesville, FL; current address: U.S. National Park Service, Department of Biology, Missouri State University, Springfield, MO), we have had the opportunity to examine several species of small Diptera that he collected with shallow pan traps from

several very small, low islets near Staniel Cay, Exuma Cays, Bahamas. Morrison conducted biogeographical and ecological studies of selected flora and fauna in the Bahamas for several years (e.g., Morrison 1997, 1998a, b, 2002a, b, 2003), but only recently collected these flies during field work in December 2002 and May 2003. Preliminary examination of these dipterans revealed three species of Chironomidae, the largest of which we tentatively identified as males of *Clunio marshalli* Stone and Wirth, a species that was originally described from Florida (Stone and Wirth 1947). Subsequently, we sent all of these chironomids to Peter Cranston, who (*in litt.*) confirmed our earlier identification of the males of *C. marshalli* and determined that the other specimens belonged to two different genera. One specimen was a female of *Chironomus* Meigen that was too badly damaged to identify to species, whereas the other specimens Cranston identified as *Mesosmittia* sp. The most common flies collected by Morrison were a very small species of *Dasyhelea*, and, after comparing these to other congeners from the New World, we concluded that it is undescribed. Herein, we de-

scribe and illustrate adults of both sexes of this previously unknown species and provide details about its habitat on the small islands from which it was collected as well as the larger, surrounding islands in the Exuma Cays, Bahamas.

For general terminology of Ceratopogonidae, see Downes and Wirth (1981); for an overview of North American *Dasyhelea*, see Waugh and Wirth (1976). Terms for general structures including genitalia and wing venation follow those in the Manual of Nearctic Diptera by McAlpine (1981) with recent modifications of wing veins proposed by Szadziwski (1996). All specimens examined were collected in 70% ethanol and subsequently mounted onto microscope slides in phenol-balsam using the methods described by Wirth and Marston (1968). Measurements and other data are presented as mean, minimum-maximum values, followed by sample size.

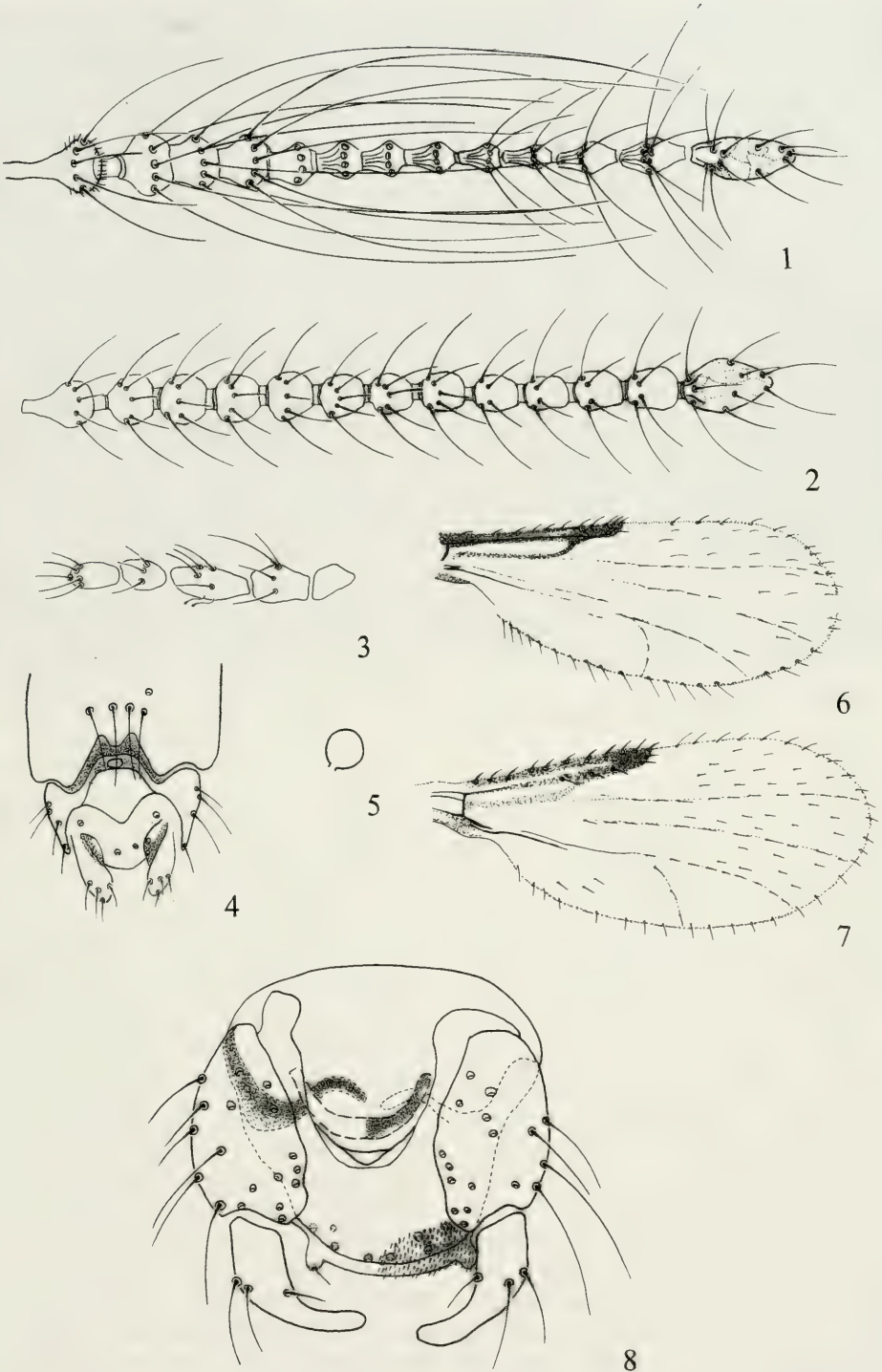
***Dasyhelea morrisoni* Grogan and
Wieners, new species**
(Figs. 1–8)

Diagnosis.—A small species of *Dasyhelea* of the *brevicornis* group that is distinguished from all New World congeners by the following combination of characters: small size (male wing length 0.57–0.63 mm; female wing length 0.59–0.70 mm); short costa (costal ratio of males 0.44–0.48; of females 0.47–0.50); wing membrane with sparse macrotrichia, absent in cell cua_1 and anal cell of males and cell cua_1 of females; halter brown; male genitalia very short with sternite 9 produced beyond apex of aedeagus; aedeagus crescent-shaped, very short, heavily sclerotized; female flagellum with flagellomeres 1–12 very short (antennal ratio 0.70–0.82), only flagellomere 13 considerably longer than broad; and spermatheca single, very small, globular with short neck.

Male.—**Head:** Dark brown. Eyes pubescent, narrowly separated. Antennal flagellum (Fig. 1) with separate flagellomeres, all

lightly sculptured; flagellomeres 11–13 only slightly longer than flagellomere 10, antennal ratio 0.48 (0.42–0.51, $n = 41$); plume of sensilla chaetica moderately dense, extending beyond flagellomere 12. Palpus light brown, 5-segmented; segment 3 with 2–3 small capitate sensilla on mesal surface; palpal ratio 2.75 (2.33–3.40, $n = 42$). Mandible vestigial, without teeth. **Thorax:** Dark brown; scutellum light brown with 2 submarginal and 4 more centrally located setae. Legs dark brown, tarsi lighter brown, darkest on tarsomeres 5; claws small, bearing a short, basal seta, nearly straight proximally with bent, entire tips. Wing (Fig. 6) hyaline, membrane covered with dense microtrichia, macrotrichia sparsely scattered on distal half, along length of most veins and most of wing margin, absent in cell cua_1 and anal cell; radial cells obliterated; base of vein M_2 not connected to M_1 ; wing length 0.60 (0.57–0.63, $n = 41$) mm; costa short, costal ratio 0.46 (0.44–0.48, $n = 41$); anal lobe poorly developed. Halter stem dark brown, knob light brown. **Abdomen:** Dark brown. Genitalia as in Fig. 8. Sternite 9 produced slightly beyond apex of aedeagus, membrane non-spiculate; tergite 9 broad, tapering slightly distally to rounded caudal margin, ventral portion of apex covered with fine setae, apicolateral processes short, rounded with single apical seta. Gonocoxite moderately short, not quite extending to bases of apicolateral processes, surface with scattered large, coarse setae; gonostylus shorter than gonocoxite, tapering and curved on distal half to rounded tip. Aedeagus very short, reduced to a narrow crescent-shape, heavily sclerotized. Parameres separate; heavily sclerotized; basal arm straight; distal portion recurved with moderately slender, rounded tips.

Female.—Slightly larger, similar to male with the following notable sexual differences. **Head:** Antennal flagellum (Fig. 2) with only flagellomere 13 distinctly longer than proximal 12; flagellomeres with basal whorl of moderately long sensilla chaetica; sculp-



Figs. 1–8. *Dasyhelea morrisoni*. 1, Flagellum of male. 2, Flagellum of female. 3, Palpus of female. 4, Female genitalia. 5, Spermatheca. 6, Wing of male. 7, Wing of female. 8, Male genitalia.

turing present only on flagellomere 13, poorly developed; antennal ratio 0.76 (0.70–0.82, $n = 31$). Palpus (Fig. 3) with segment 3 moderately broad; palpal ratio 2.63 (2.17–3.00, $n = 30$). *Thorax*: Legs, including tarsi lighter brown, darkest on tarsomeres 5; claws more curved than those of male, tips entire. Wing (Fig. 7) broader than male, with more macrotrichia on distal half of wing membrane and in anal cell; wing broader, slightly longer than male, wing length 0.63 (0.59–0.70, $n = 30$) mm; costa slightly longer than male, costal ratio 0.48 (0.47–0.50, $n = 30$). *Abdomen*: Lighter brown. Genitalia as in Fig. 4. Sternite 8 bearing 4–5 large setae anterior to caudal margin, caudal margin with sclerotized M-shaped marking; sternite 9 entire, vaginal lumen ovoid; sternite 10 with pair of widely spaced sub-basal setae and posterior pair of narrowly separated setae. Spermatheca (Fig. 5) single, very small, globular with short neck; length (including neck) 0.029 (0.026–0.032, $n = 30$) mm, breadth 0.036 (0.023–0.029, $n = 20$) mm.

Distribution.—Known only from the type locality, several small islets near Staniel Cay, Exuma Cays, Bahamas.

Types.—Holotype ♂; allotype ♀; paratypes, 36 ♂, 25 ♀, Bahamas, small islands near Staniel Cay, Exuma Cays, 16-V-2003, L. Morrison, pan trap; 5 ♂, 5 ♀ paratypes with same data except collected 12-VII-2002. The holotype, allotype and most paratypes are deposited in the National Museum of Natural History, Washington, D. C. Other paratypes are deposited in the Canadian National Collection of Insects, Ottawa, Florida State Collection of Arthropods, Gainesville, Museo de La Plata, Argentina, Collection of Arthropods with Medical Importance of the Instituto Nacional de Diagnostico and Referencia Epidemiologicos, Mexico City, Instituto Oswaldo Cruz, Rio de Janeiro, Brazil, and Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica.

Etymology.—We are pleased to name this new species in honor of Lloyd Morri-

son, who collected the entire type series on the small, low, rocky islands during field work in the Exuma Cays, Bahamas.

Discussion.—This new species is apparently most closely related to *D. brevicornis* Waugh and Wirth (1976) from Maryland, New York, and Nova Scotia, the females of which also have an antennal flagellum with the proximal 12 flagellomeres very short with only flagellomere 13 being distinctly longer than broad. Females of *D. brevicornis* differ from those of *D. morrisoni* in being slightly larger (wing length 0.74–0.87 mm), the wing membrane covered with dense macrotrichia that are present in all cells, the medial portion of the genital sclerotization on the caudal margin of sternite 9 is arrowhead-shaped and the spermatheca is larger with a very long, slender neck. The male of *D. brevicornis* is unknown; however, we believe that these two species are members of the same species group, which we recognize here as the *Dasyhelea brevicornis* group (**new species group**).

Among the circum-Caribbean species of *Dasyhelea*, the only species that might be confused with *D. morrisoni* is *D. pygmaea* (Williston) which was described from only three female specimens from St. Vincent (Lesser Antilles). Females of this species from the southeastern Caribbean differ from those of *D. morrisoni* in having a much narrower wing with dense macrotrichia on the wing membrane of all cells (Williston 1896). Another New World species that might be confused with *D. morrisoni* is the recently described *D. huasteca* Huerta and Ibanez-Bernal, which is known only from two females from San Luis Potosi, Mexico. Females of this Mexican species differ from those of *D. morrisoni* in having an antennal flagellum with all flagellomeres longer than broad, a more slender wing with denser macrotrichia on the wing membrane of all cells, an abdomen with very long cerci, a small crescent-shaped sclerotization near the caudal margin of sternite 9 and a larger (length 0.04 mm), subspherical spermathe-



Fig. 9. Photograph of small island near Staniel Cay, Exuma Cays, Bahamas, from which a portion of the type series of *Dasyhelea morrisoni* was collected. Photo by Lloyd Morrison.

ca with a very small, rudimentary 2nd spermatheca (Huerta and Ibanez-Bernal 1999).

The very small male genitalia of *D. morrisoni* are somewhat reminiscent of those of *D. forsteri* Grogan and Wirth from the Solomon Islands in that the aedeagus of this south Pacific species is also short, crescent-shaped and is covered by an extension of sternite 9. The male of this south Pacific species is only known from the allotype from San Cristobal Island and differs from *D. morrisoni* in being even smaller (wing length 0.55 mm), having a wing membrane nearly devoid of macrotrichia, exhibiting more massive parameres, and possessing shorter gonocoxites and gonostyli (Grogan and Wirth 1981).

Bionomics.—*Dasyhelea morrisoni* was abundant on very small (usually ≤ 200 m²) islands (Fig. 9) in the Central Exuma Cays, Bahamas. These small islands are composed of marine limestone and were either barren of terrestrial vegetation or supported

one or two of three plant species: *Sesuvium portulacastrum* L., *Rhachicallis americana* (Jacq.), or *Conocarpus erectus* L. These are very low-lying islands (< 1.5 m) and, although they are emergent at all but possibly the highest tides, they are frequently wet due to salt spray and waves breaking over them.

A diversity of arthropod species was found on these small islands, including representatives of 10 different orders. A total of 658 individuals of *D. morrisoni* were collected in pan traps and pitfall traps on 10 small islands, and summed over two 24 h sampling intervals, one in December 2002 and one in May 2003. This species was the most abundant arthropod sampled on the small islands, representing $>90\%$ of all dipterans and $>75\%$ of all insects (Morrison 2005).

Currently, little is known of the ecology and natural history of *D. morrisoni*. Larger islands, with higher plant species diversities

(Morrison 1997, 2003), are located within several hundred to several thousand meters of the smaller islands, but, these larger islands have not yet been sampled for small Diptera. It is unknown whether *D. morrisoni* completes its life cycle on the small islands or disperses to or from larger islands. Because adult females of *Dasyhelea* are incapable of taking blood meals, it is possible that they can mate and lay a clutch of eggs without even feeding on nectar (Downes 1969). Alternatively, adults of this new species may feed on flowers on nearby, larger islands before engaging in reproductive activities. They may then congregate on the smaller islands, which likely serve as 'swarming markers' for males who copulate with females as they enter their all-male swarms. In the case of this new species, it is unknown whether their eggs are deposited on the smaller or larger islands, but, we suspect that it is more likely the latter case since the larger islands contain more food resources for their developing larvae.

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